OIPE
JUL 30 2004
PATENT & TRADEMARK OFFICE

Fig.1

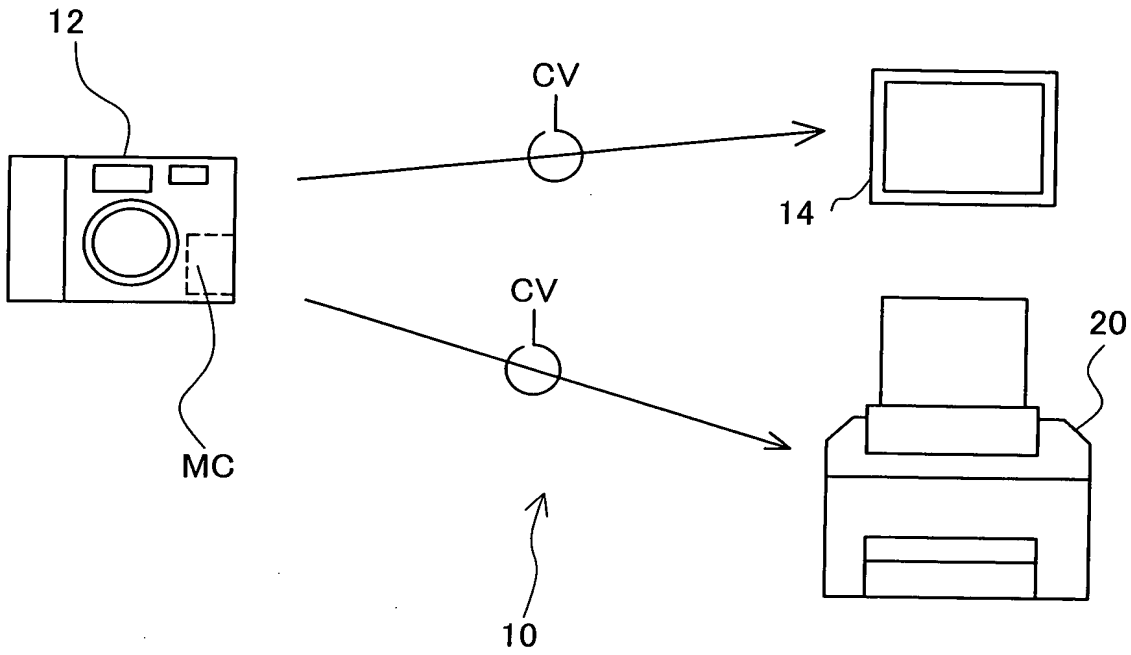

Fig.2

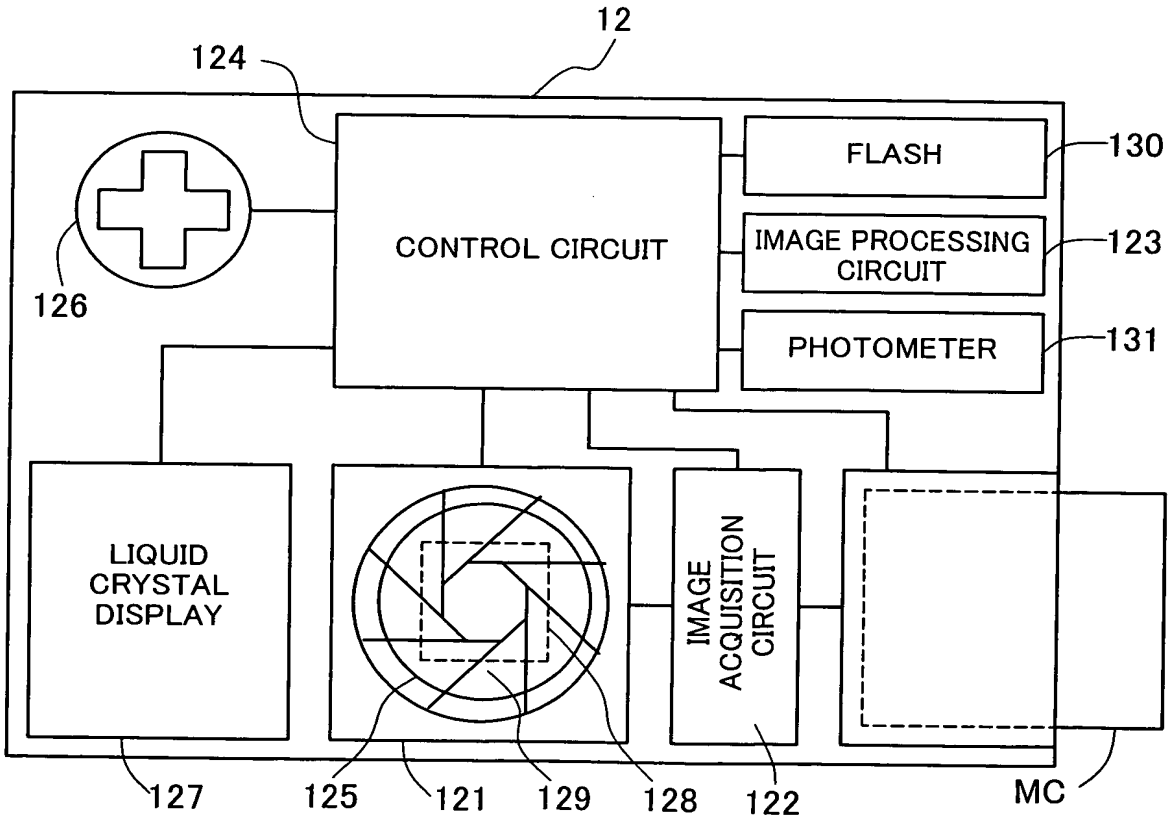

Fig.3

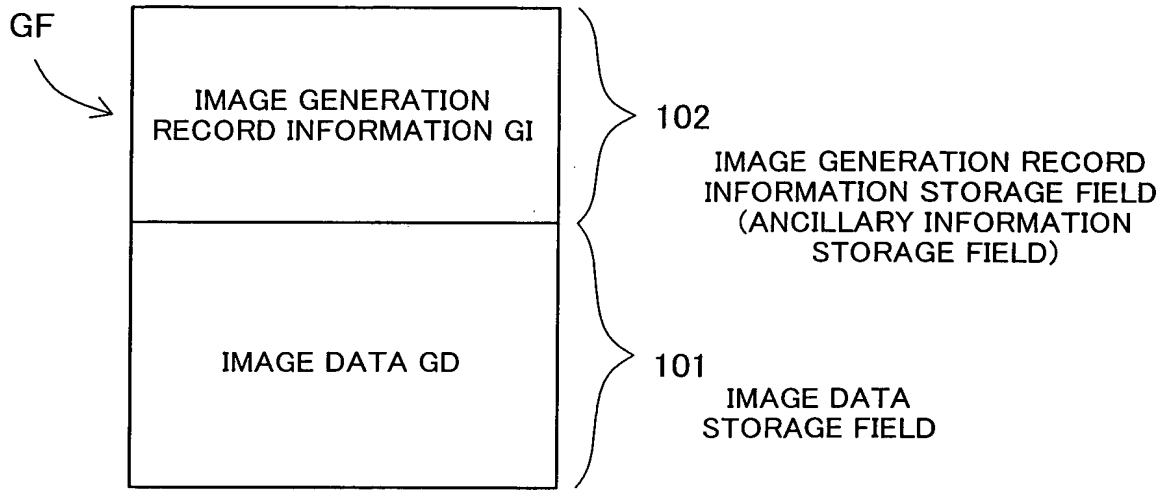
GF
IMAGE GENERATION RECORD INFORMATION GI
IMAGE DATA GD
102
IMAGE GENERATION RECORD INFORMATION STORAGE FIELD (ANCILLARY INFORMATION STORAGE FIELD)
101
IMAGE DATA STORAGE FIELD

Fig.4

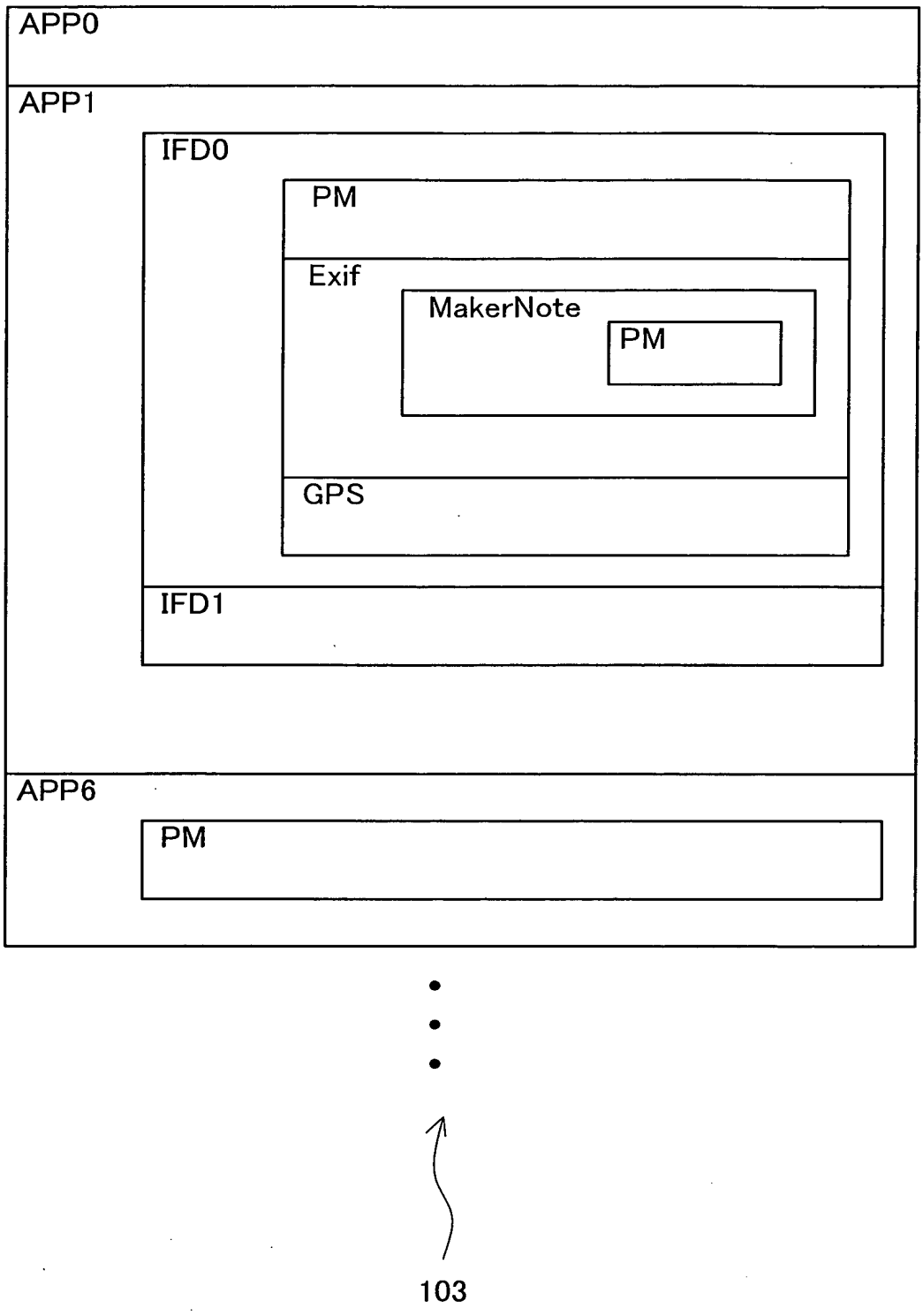

Fig.5

Tag name	Parameter value
Subject brightness	5(APEX)
Flash	• Auto flash mode • Fired • Reflected light sensor present • Reflected light sensed
Subject distance	1.5(m)
Subject distance range	Near distance
Flash intensity	1000(BCPS)
Aperture value	F4
Shutter speed	1/60 sec
ISO speed rate	100
White balance	Auto

●
●
●

Fig.6

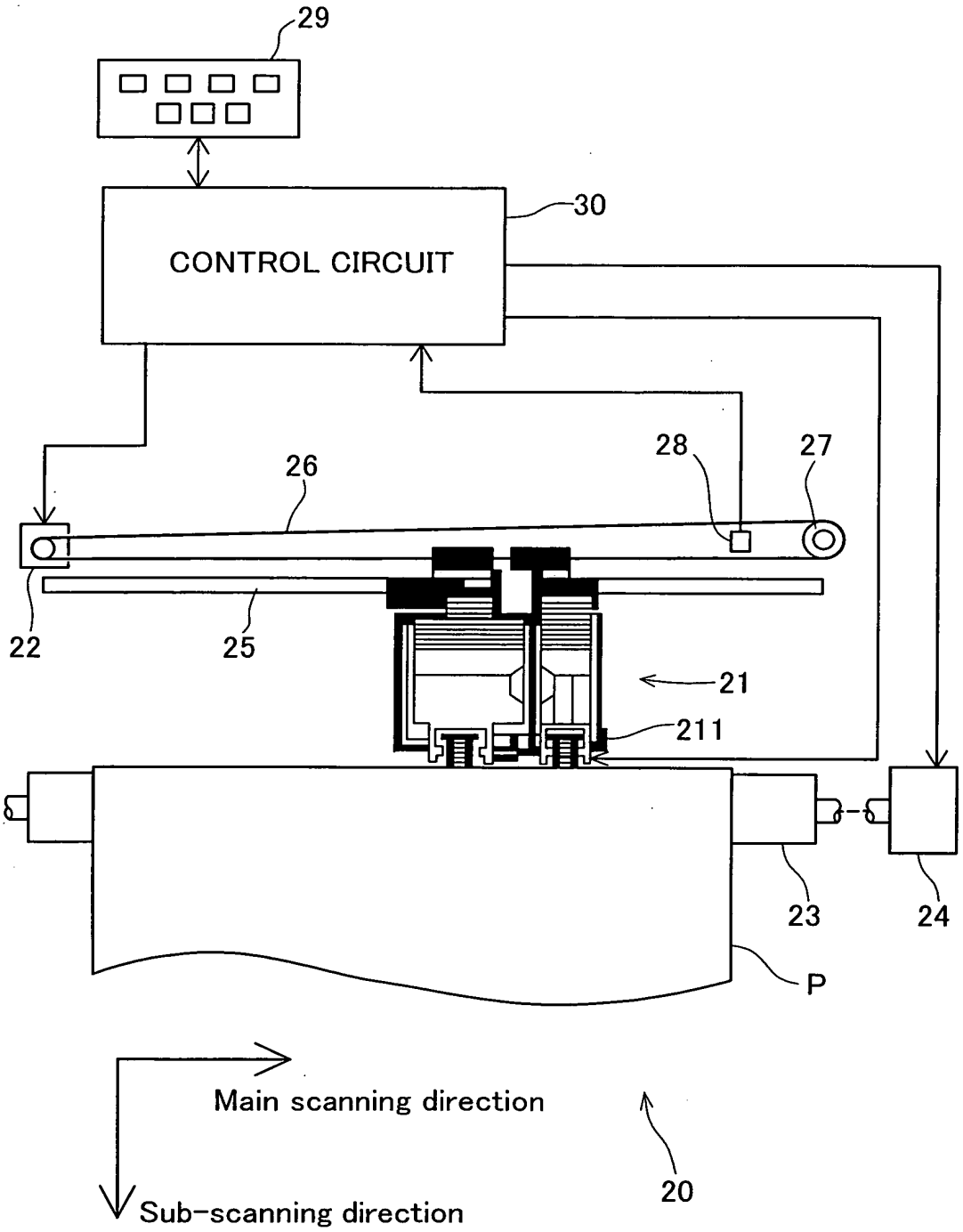
29
CONTROL CIRCUIT
30
28
27
26
22
25
21
211
23
24
P
Main scanning direction
Sub-scanning direction
20

Fig.7

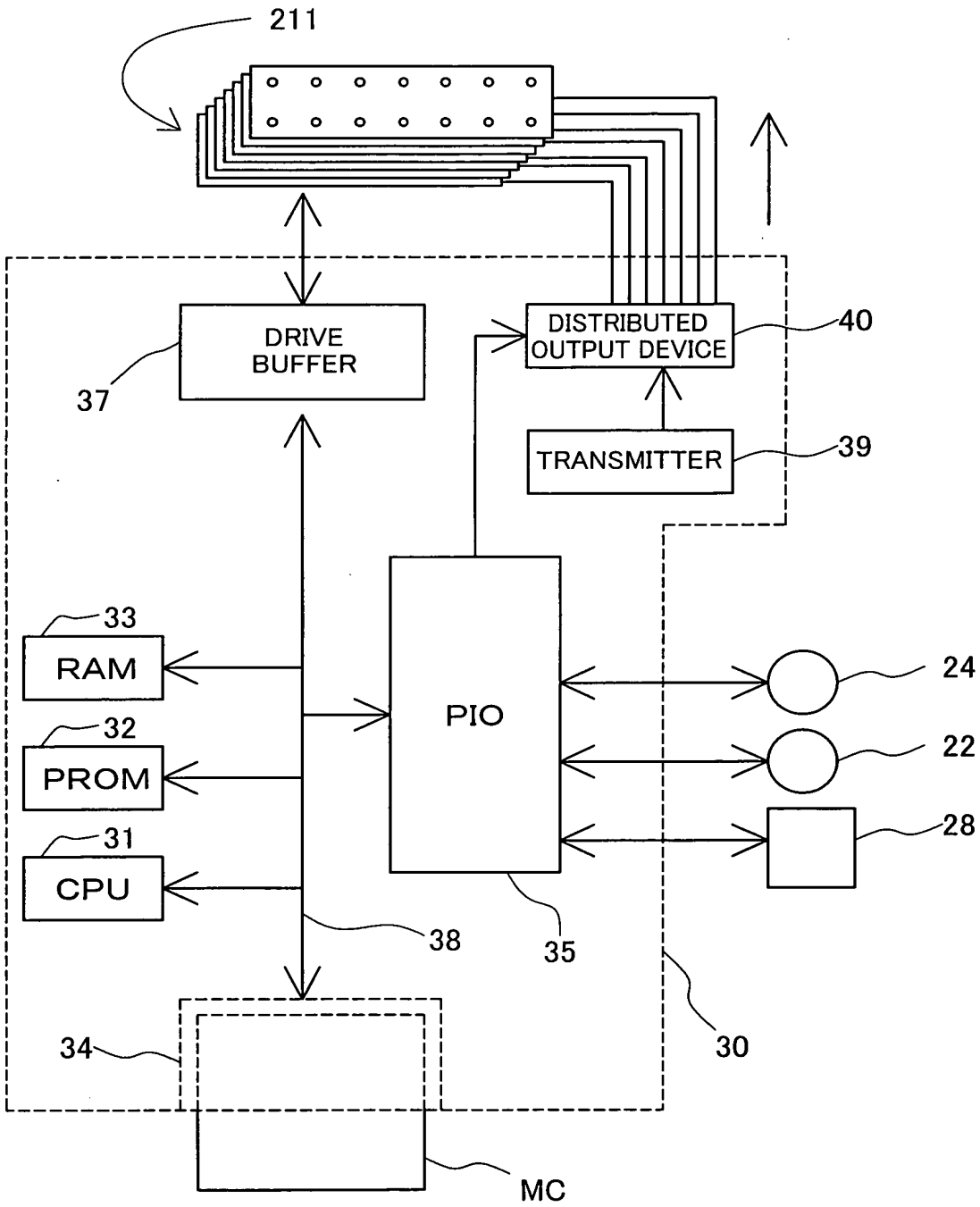
211
DRIVE BUFFER
37
DISTRIBUTED OUTPUT DEVICE
40
TRANSMITTER
39
33
RAM
32
PROM
31
CPU
PIO
24
22
28
38
35
34
30
MC

Fig.8

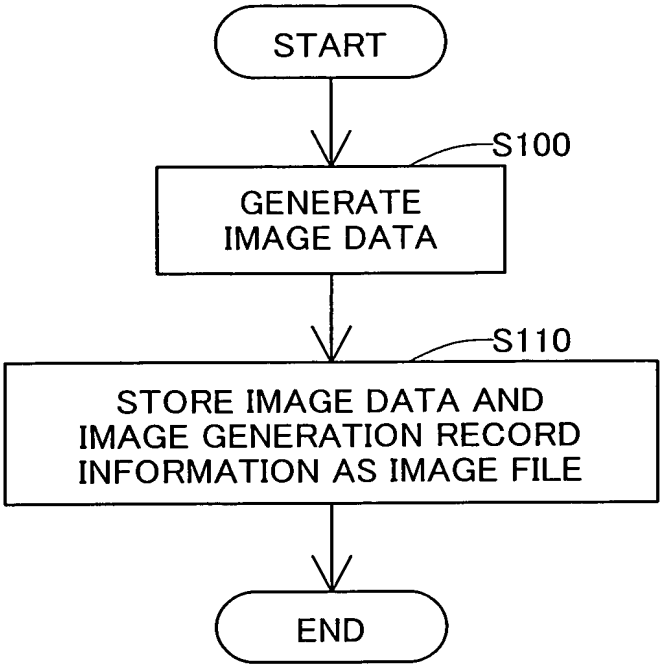
START
S100
GENERATE IMAGE DATA
S110
STORE IMAGE DATA AND IMAGE GENERATION RECORD INFORMATION AS IMAGE FILE
END

Fig.9

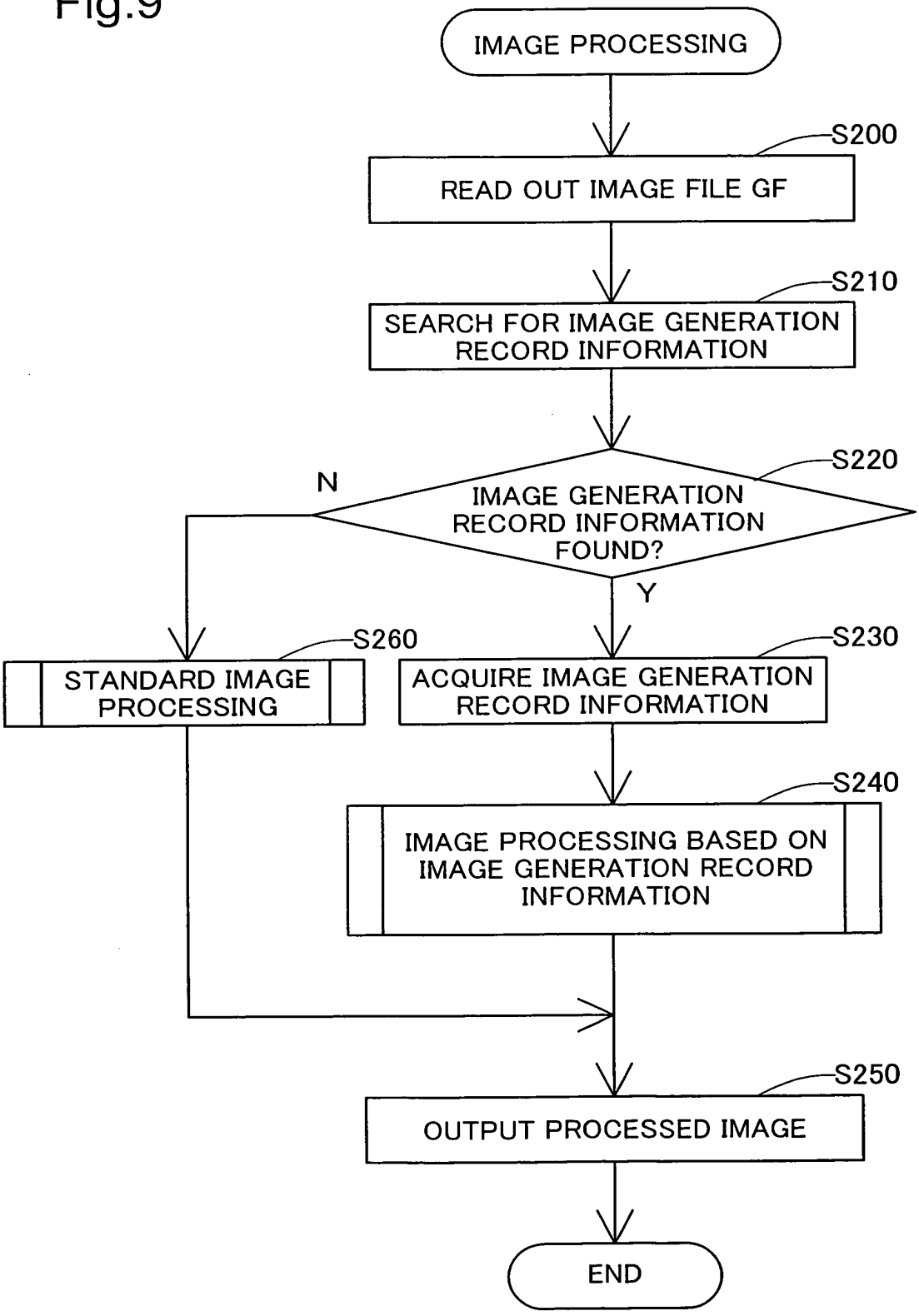
IMAGE PROCESSING
S200
READ OUT IMAGE FILE GF
S210
SEARCH FOR IMAGE GENERATION RECORD INFORMATION
S220
IMAGE GENERATION RECORD INFORMATION FOUND?
N
Y
S260
STANDARD IMAGE PROCESSING
S230
ACQUIRE IMAGE GENERATION RECORD INFORMATION
S240
IMAGE PROCESSING BASED ON IMAGE GENERATION RECORD INFORMATION
S250
OUTPUT PROCESSED IMAGE
END

Fig.10

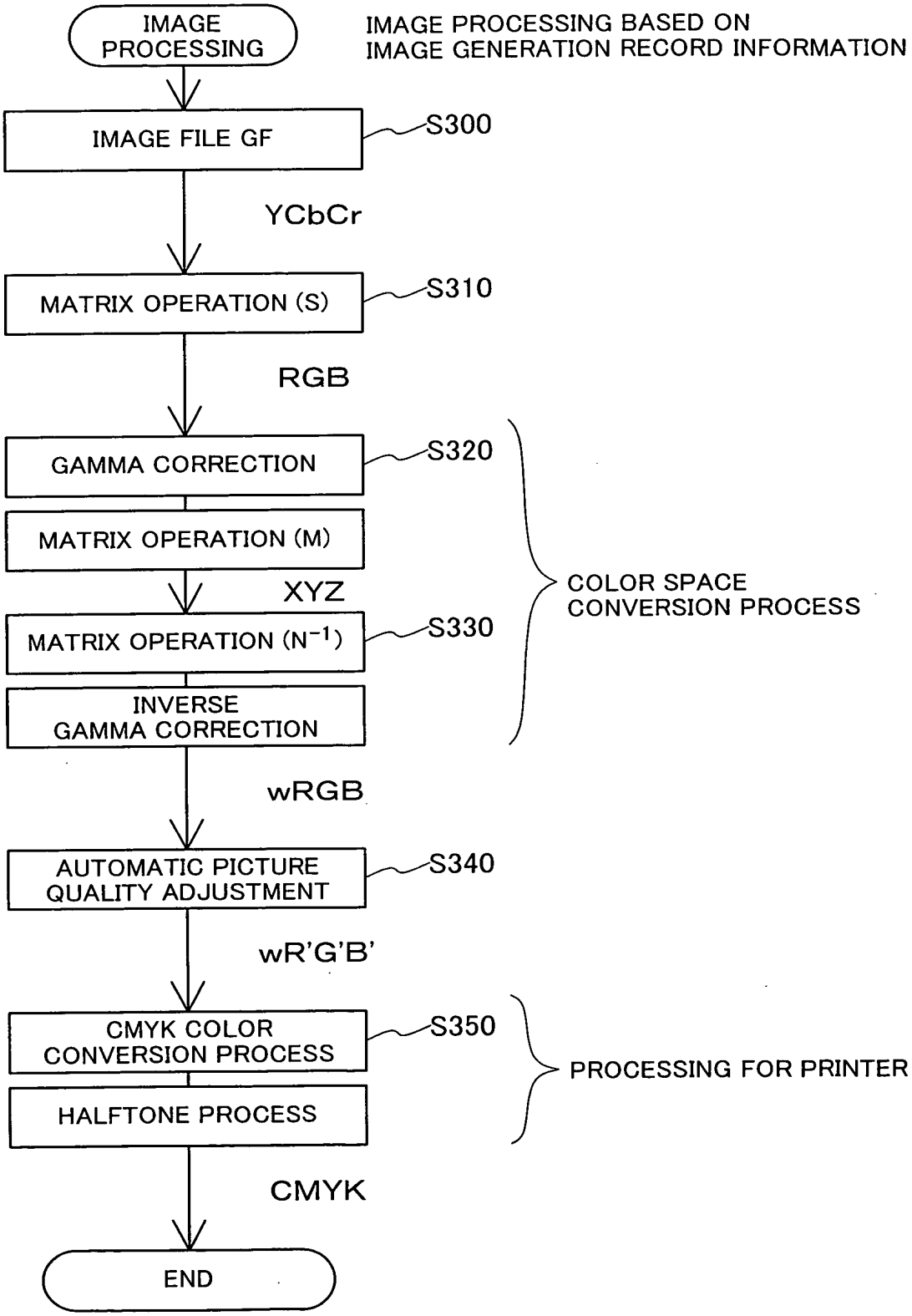
IMAGE PROCESSING
IMAGE PROCESSING BASED ON IMAGE GENERATION RECORD INFORMATION
IMAGE FILE GF
S300
YCbCr
MATRIX OPERATION (S)
S310
RGB
GAMMA CORRECTION
S320
MATRIX OPERATION (M)
XYZ
MATRIX OPERATION (N-1)
S330
INVERSE GAMMA CORRECTION
COLOR SPACE CONVERSION PROCESS
wRGB
AUTOMATIC PICTURE QUALITY ADJUSTMENT
S340
wR'G'B'
CMYK COLOR CONVERSION PROCESS
S350
HALFTONE PROCESS
PROCESSING FOR PRINTER
CMYK
END

Fig.11

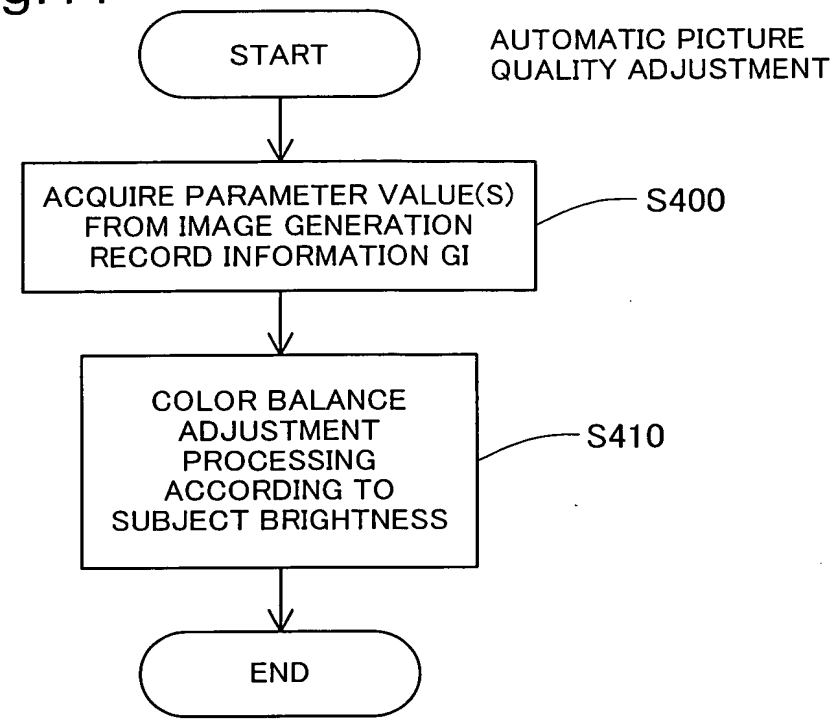
START
AUTOMATIC PICTURE QUALITY ADJUSTMENT
ACQUIRE PARAMETER VALUE(S) FROM IMAGE GENERATION RECORD INFORMATION GI
S400
COLOR BALANCE ADJUSTMENT PROCESSING ACCORDING TO SUBJECT BRIGHTNESS
S410
END

Fig.12

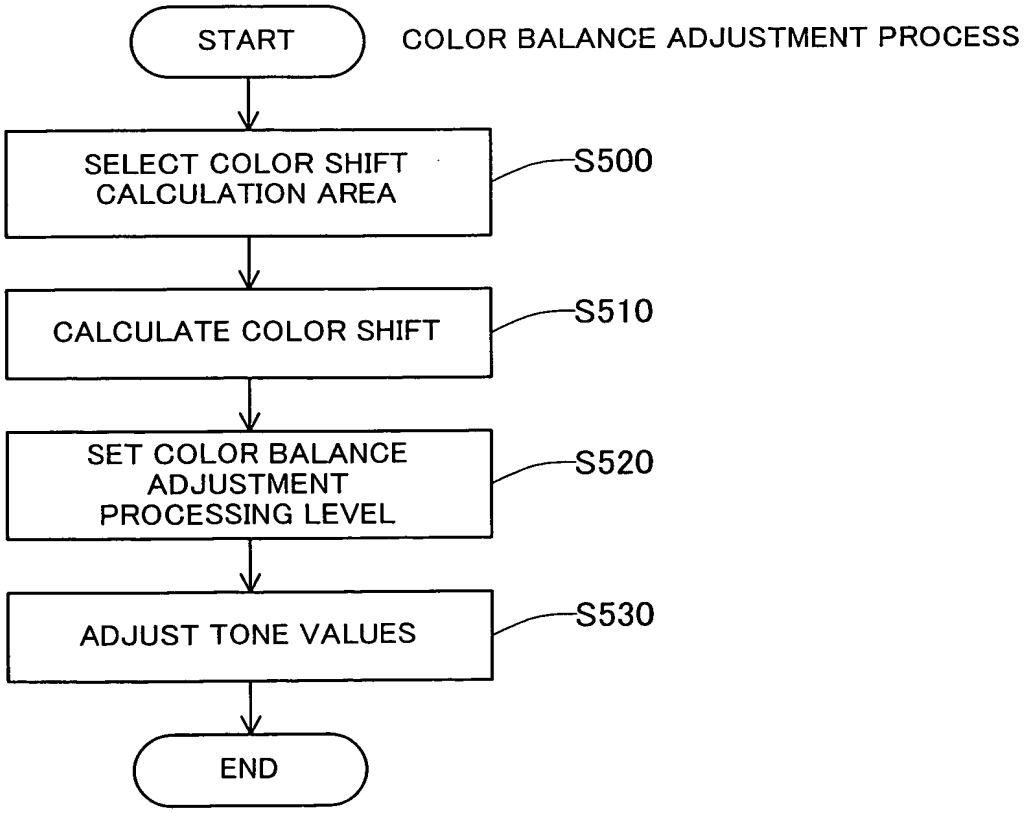
START
COLOR BALANCE ADJUSTMENT PROCESS
SELECT COLOR SHIFT CALCULATION AREA
S500
CALCULATE COLOR SHIFT
S510
SET COLOR BALANCE ADJUSTMENT PROCESSING LEVEL
S520
ADJUST TONE VALUES
S530
END

Fig.13(a)

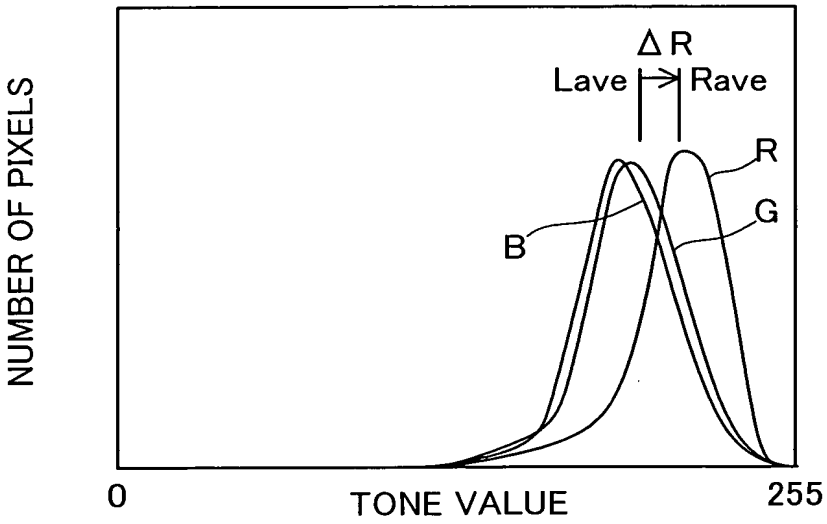

Fig.13(b)

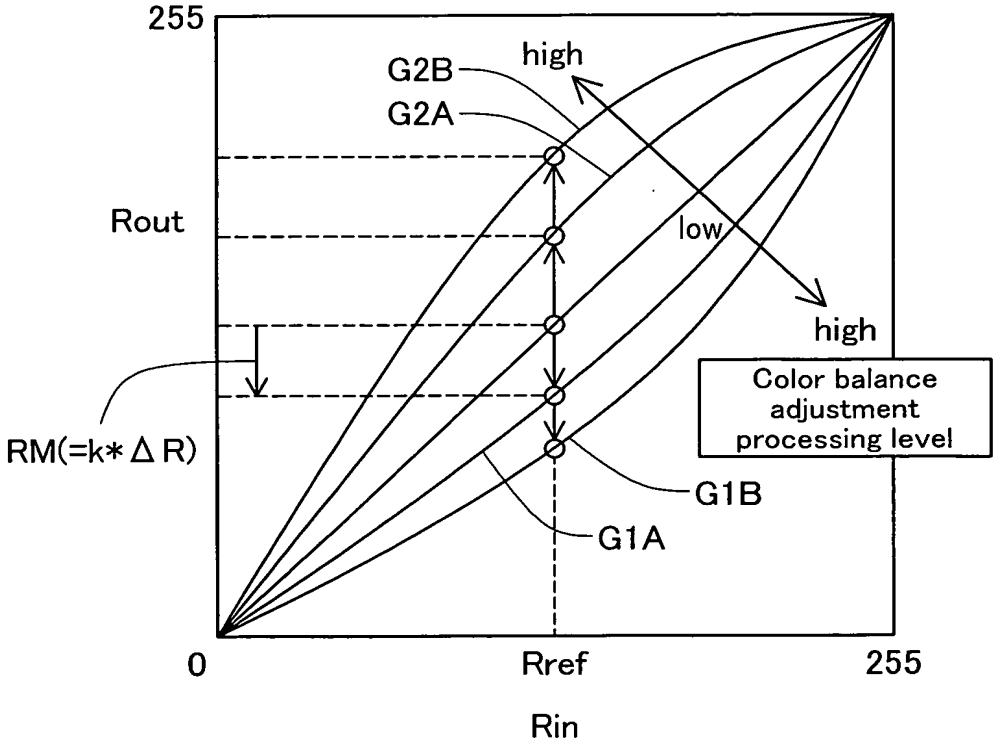

Fig.14(a)

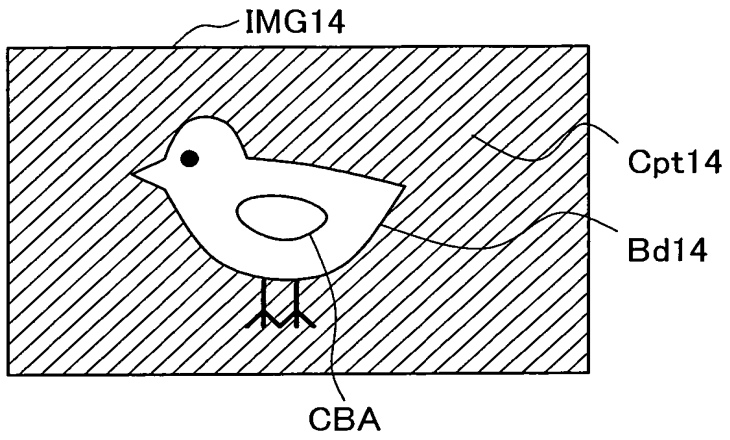

Fig.14(b)

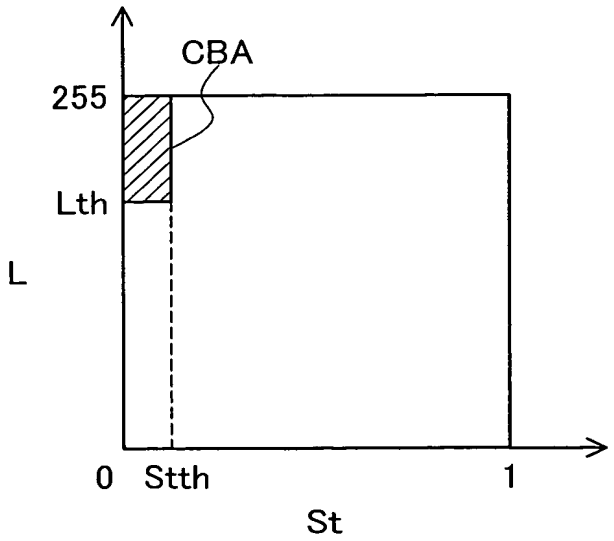

Fig.15(a)

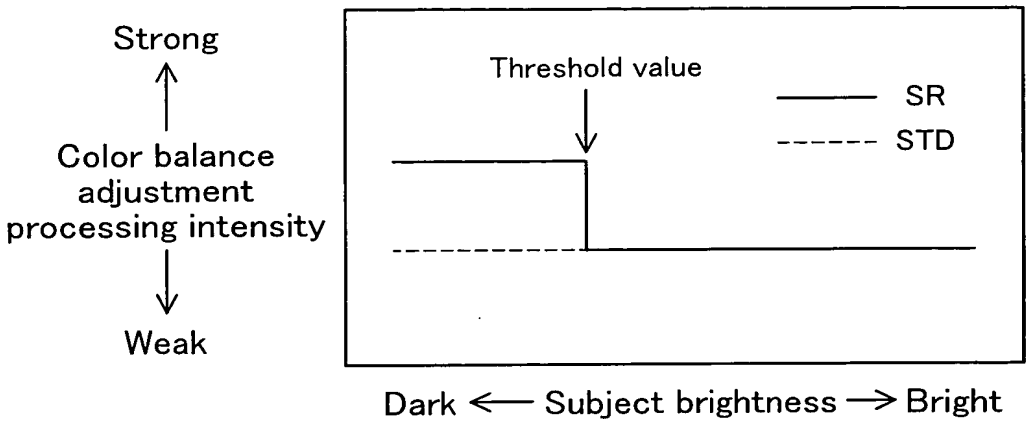

Fig.15(b)

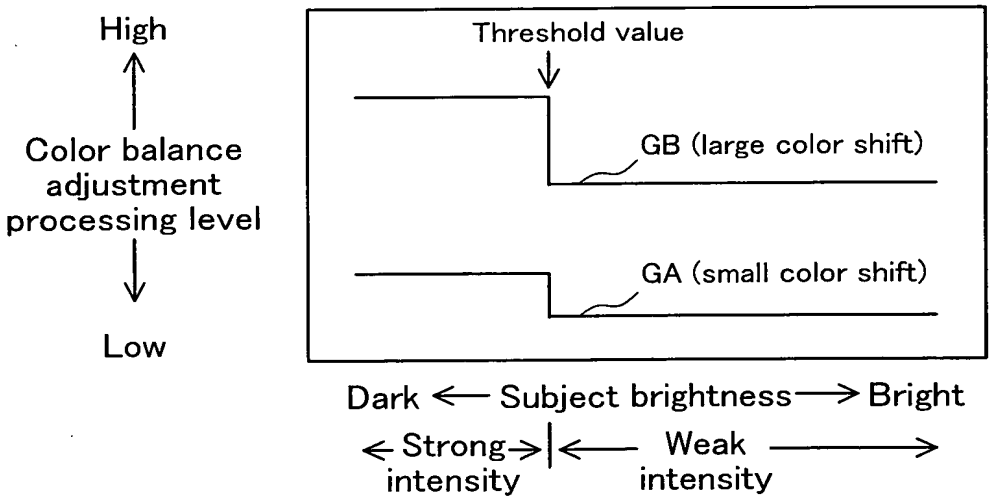

Fig.16

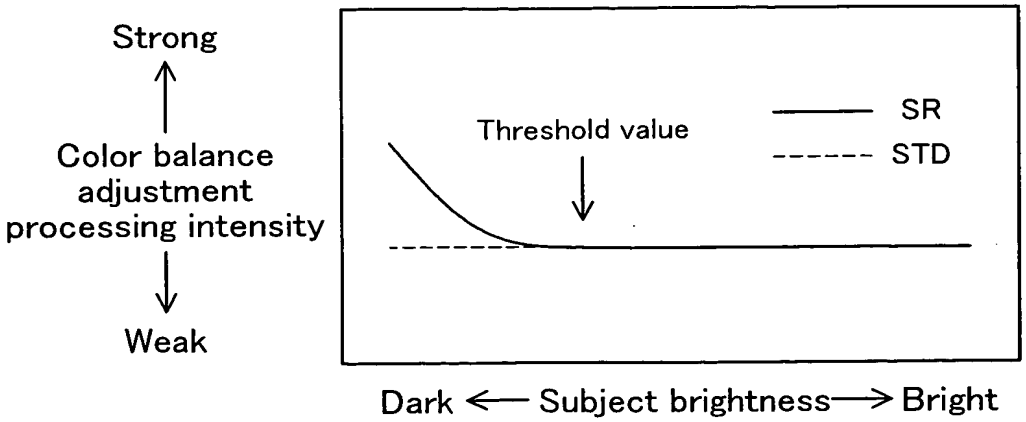

Fig.17(a)

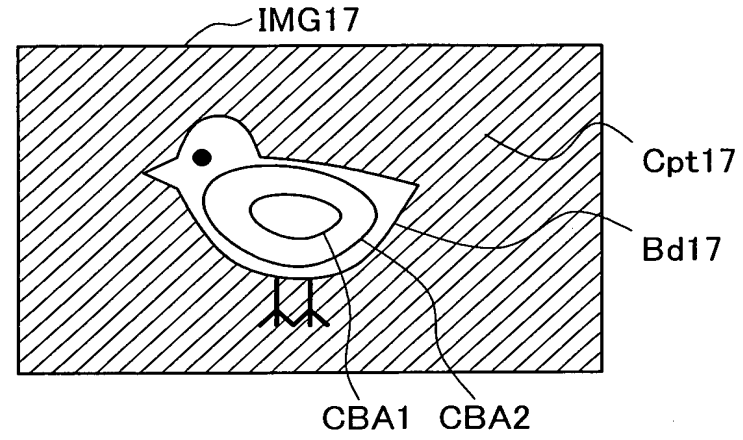

Fig.17(b)

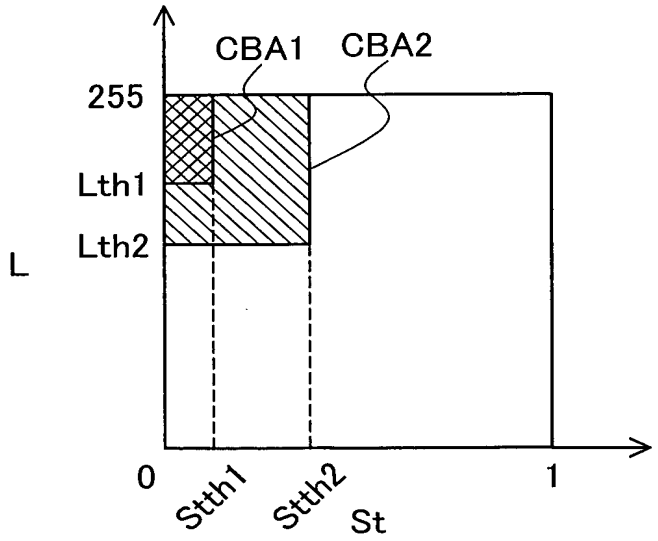

Fig.18

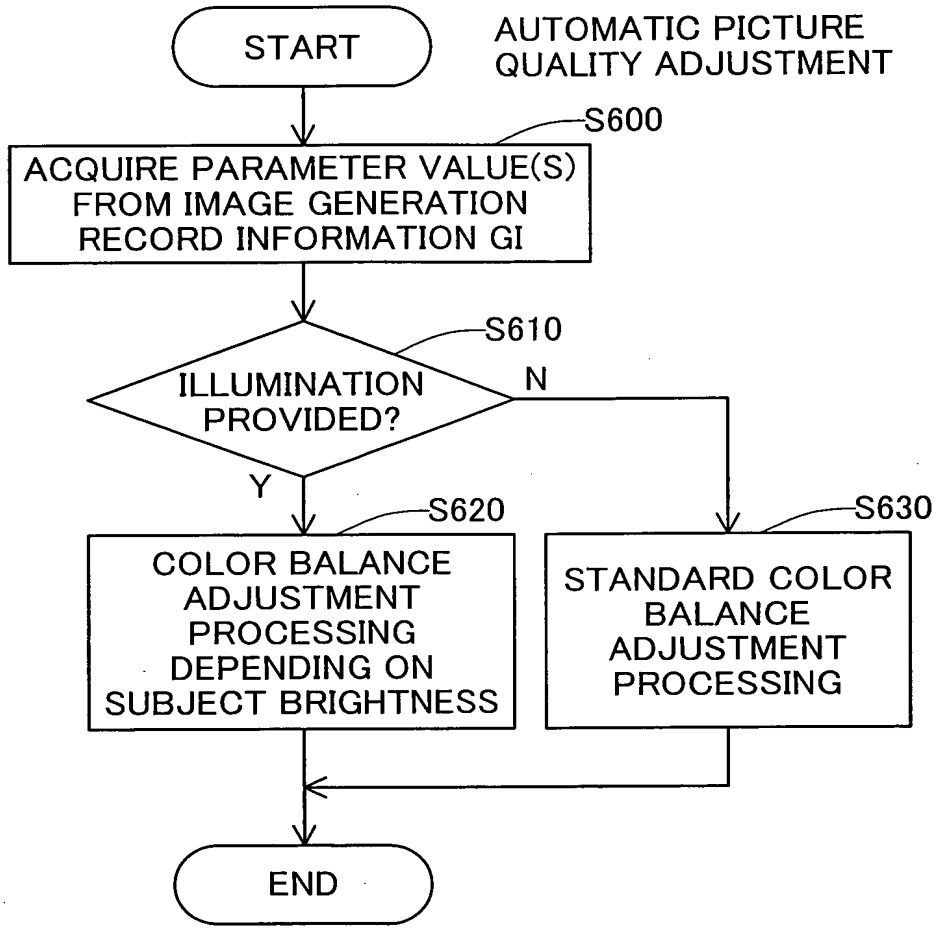
START
AUTOMATIC PICTURE QUALITY ADJUSTMENT
S600
ACQUIRE PARAMETER VALUE(S) FROM IMAGE GENERATION RECORD INFORMATION GI
S610
ILLUMINATION PROVIDED?
N
Y
S620
COLOR BALANCE ADJUSTMENT PROCESSING DEPENDING ON SUBJECT BRIGHTNESS
S630
STANDARD COLOR BALANCE ADJUSTMENT PROCESSING
END

Fig.19

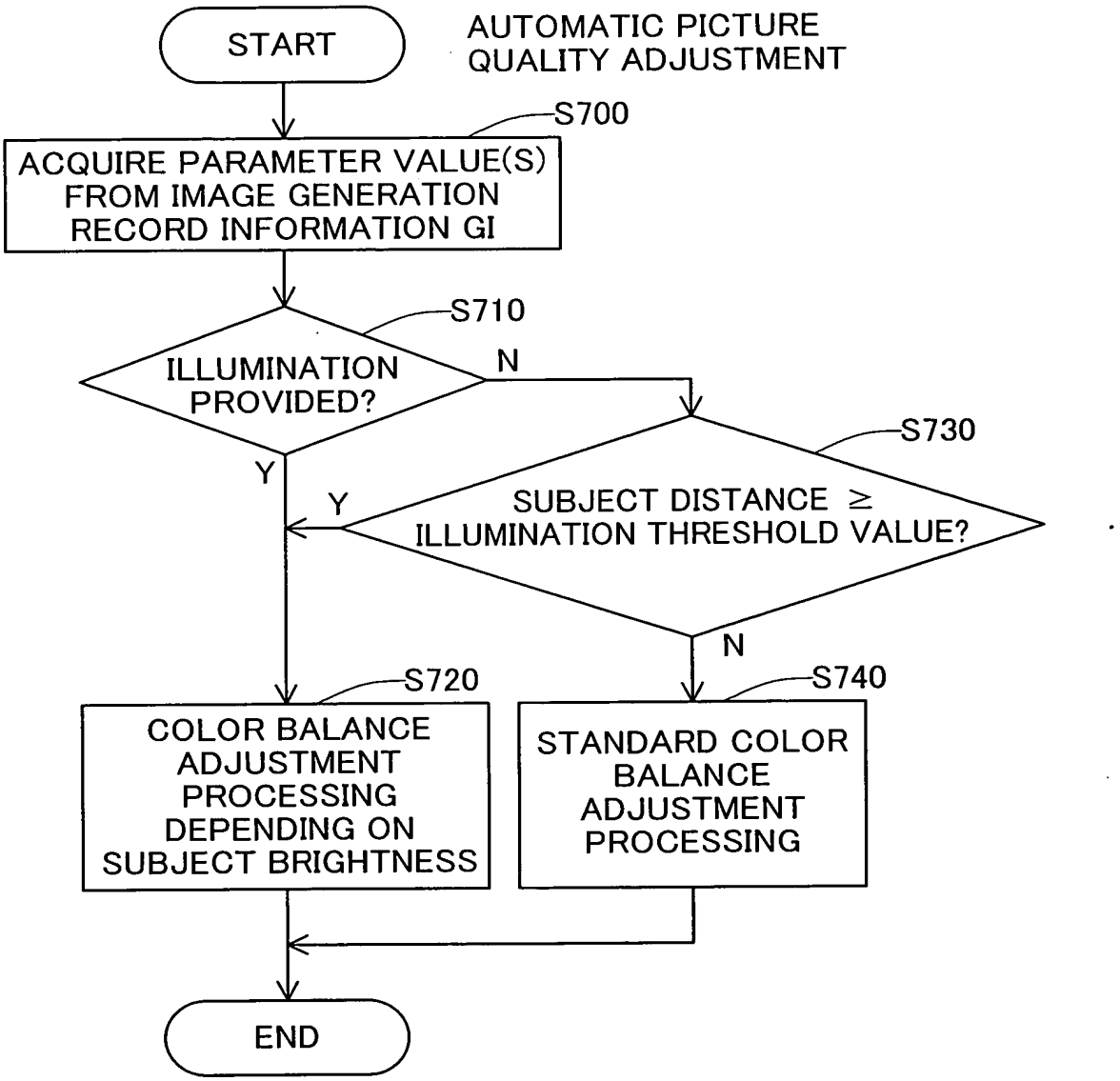
START
AUTOMATIC PICTURE QUALITY ADJUSTMENT
S700
ACQUIRE PARAMETER VALUE(S) FROM IMAGE GENERATION RECORD INFORMATION GI
S710
ILLUMINATION PROVIDED?
N
Y
S730
SUBJECT DISTANCE ≥ ILLUMINATION THRESHOLD VALUE?
Y
N
S720
COLOR BALANCE ADJUSTMENT PROCESSING DEPENDING ON SUBJECT BRIGHTNESS
S740
STANDARD COLOR BALANCE ADJUSTMENT PROCESSING
END

Fig.20

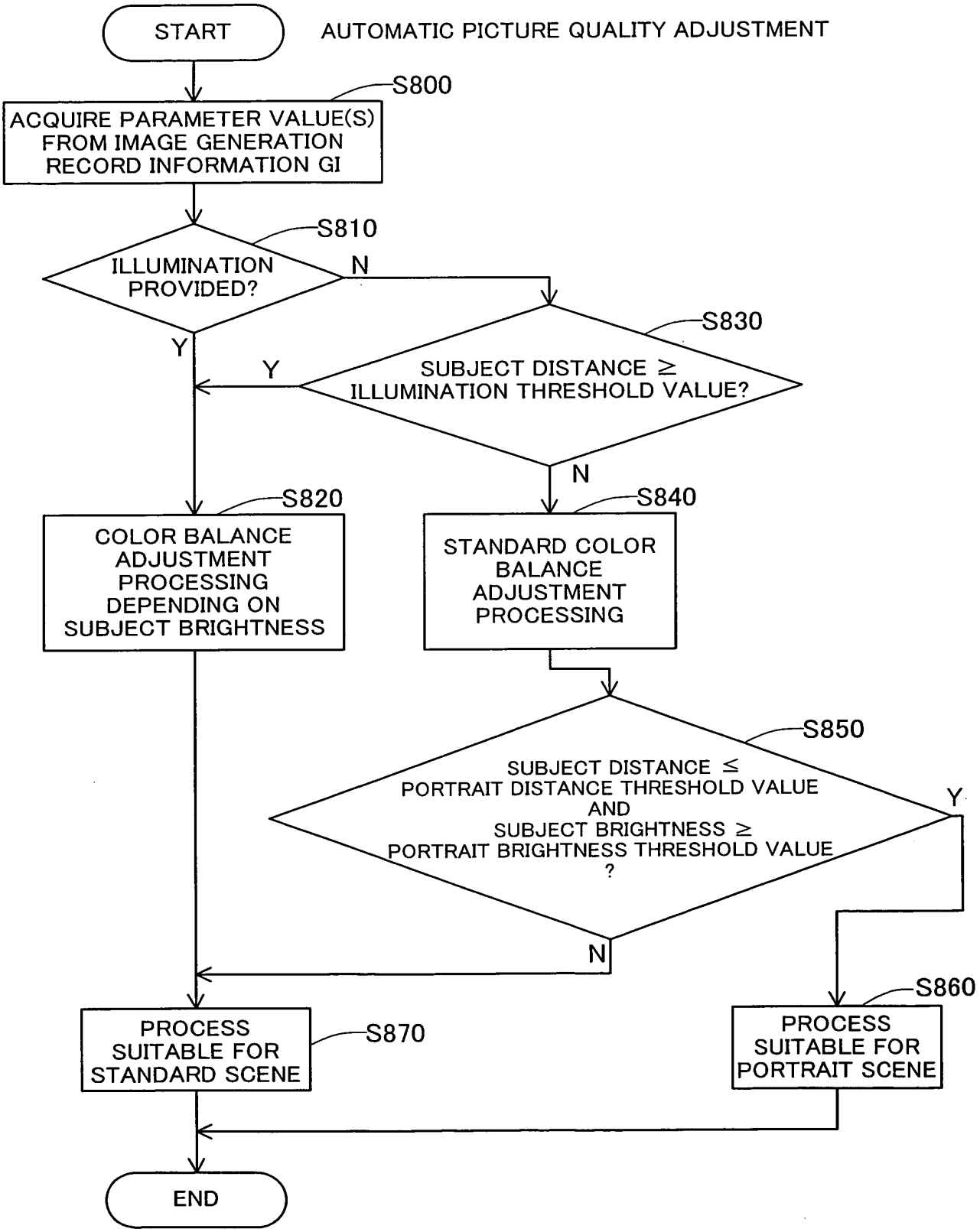
START
AUTOMATIC PICTURE QUALITY ADJUSTMENT
S800
ACQUIRE PARAMETER VALUE(S) FROM IMAGE GENERATION RECORD INFORMATION GI
S810
ILLUMINATION PROVIDED?
N
Y
S830
SUBJECT DISTANCE ≥ ILLUMINATION THRESHOLD VALUE?
Y
N
S820
COLOR BALANCE ADJUSTMENT PROCESSING DEPENDING ON SUBJECT BRIGHTNESS
S840
STANDARD COLOR BALANCE ADJUSTMENT PROCESSING
S850
SUBJECT DISTANCE ≤ PORTRAIT DISTANCE THRESHOLD VALUE AND SUBJECT BRIGHTNESS ≥ PORTRAIT BRIGHTNESS THRESHOLD VALUE ?
Y
N
S860
PROCESS SUITABLE FOR PORTRAIT SCENE
S870
PROCESS SUITABLE FOR STANDARD SCENE
END

Fig.21

Scene	Standard	Portrait
Contrast	Standard	Moderately soft
Brightness	Standard	Moderately bright
Saturation	Standard	Moderately low
Sharpness	Standard	Moderately weak
Memory color	OFF	Skin color
Noise reduction	OFF	OFF

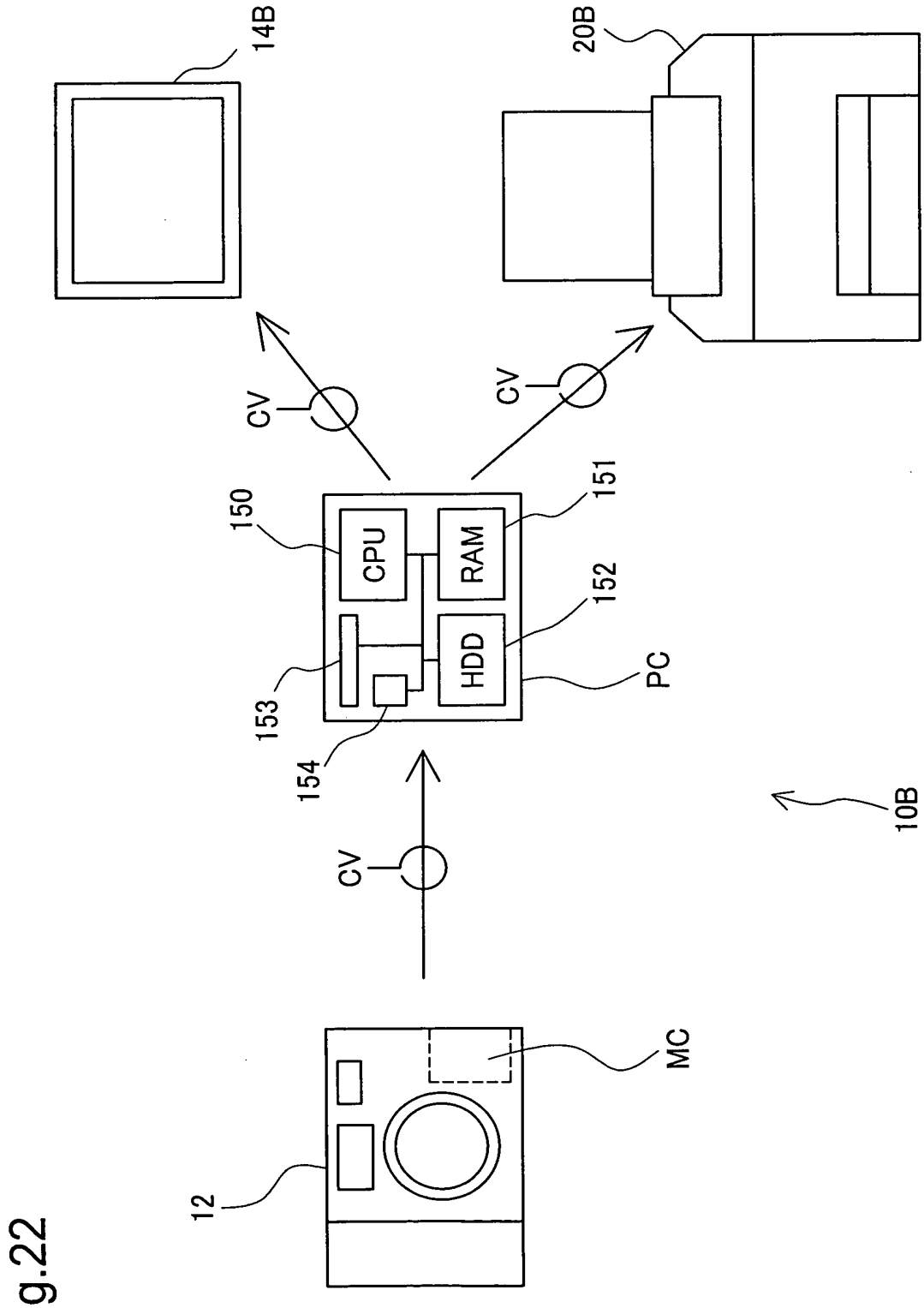

Fig.22

Fig.23

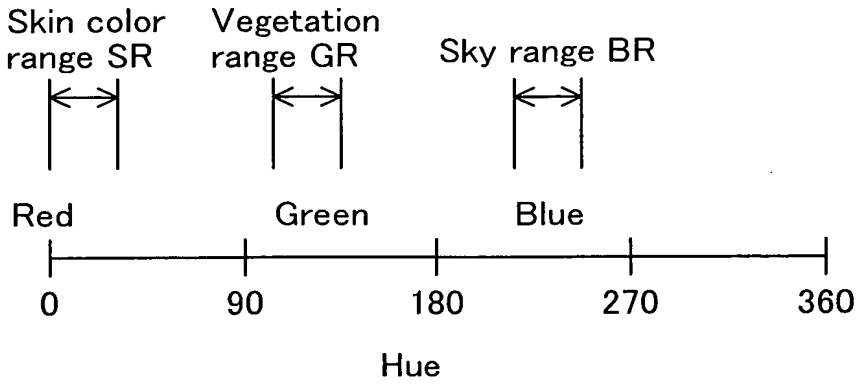
Skin color range SR
Vegetation range GR
Sky range BR
Red
Green
Blue
0
90
180
270
360
Hue

Fig.24

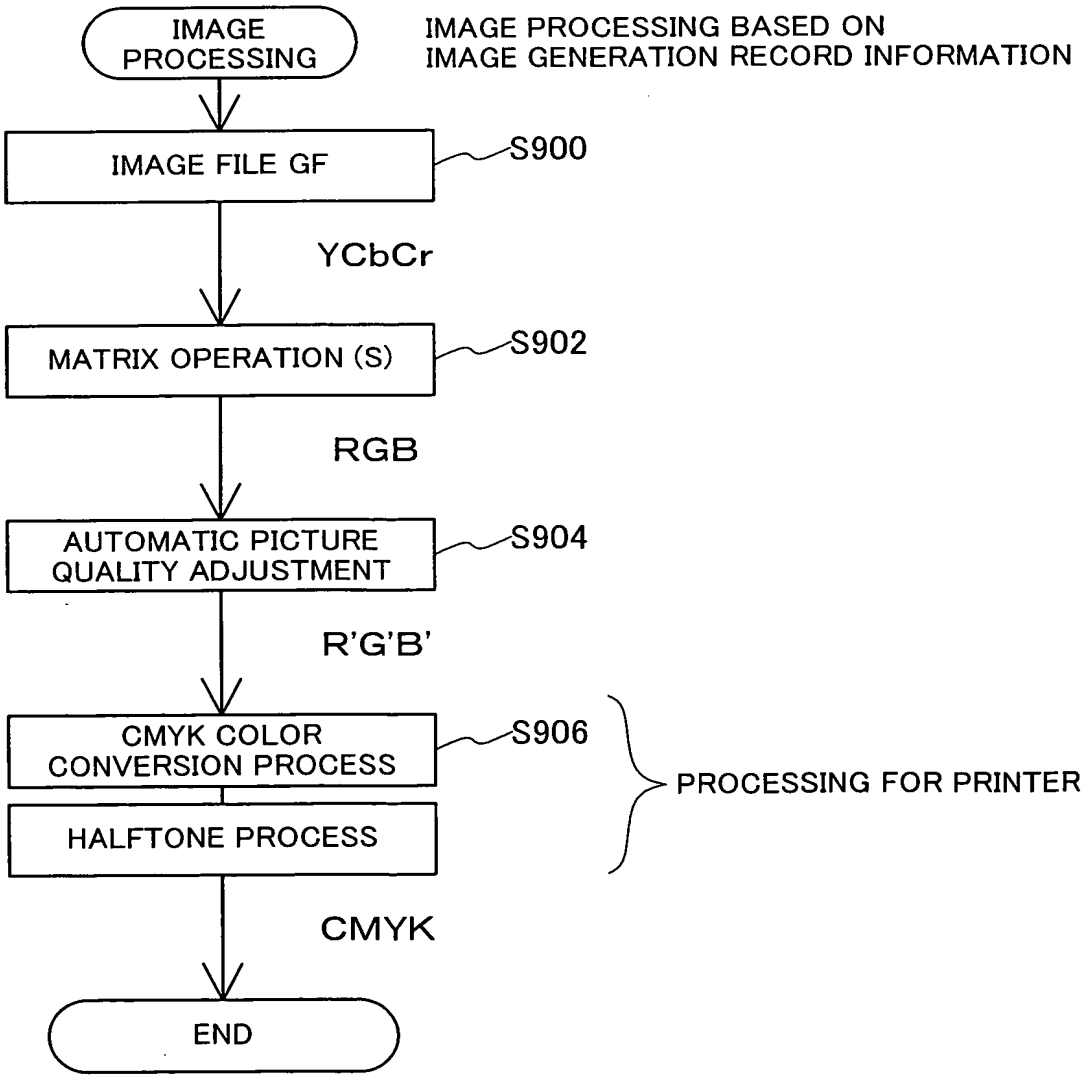
IMAGE PROCESSING
IMAGE PROCESSING BASED ON IMAGE GENERATION RECORD INFORMATION
IMAGE FILE GF
S900
YCbCr
MATRIX OPERATION (S)
S902
RGB
AUTOMATIC PICTURE QUALITY ADJUSTMENT
S904
R'G'B'
CMYK COLOR CONVERSION PROCESS
S906
HALFTONE PROCESS
PROCESSING FOR PRINTER
CMYK
END

Fig.25

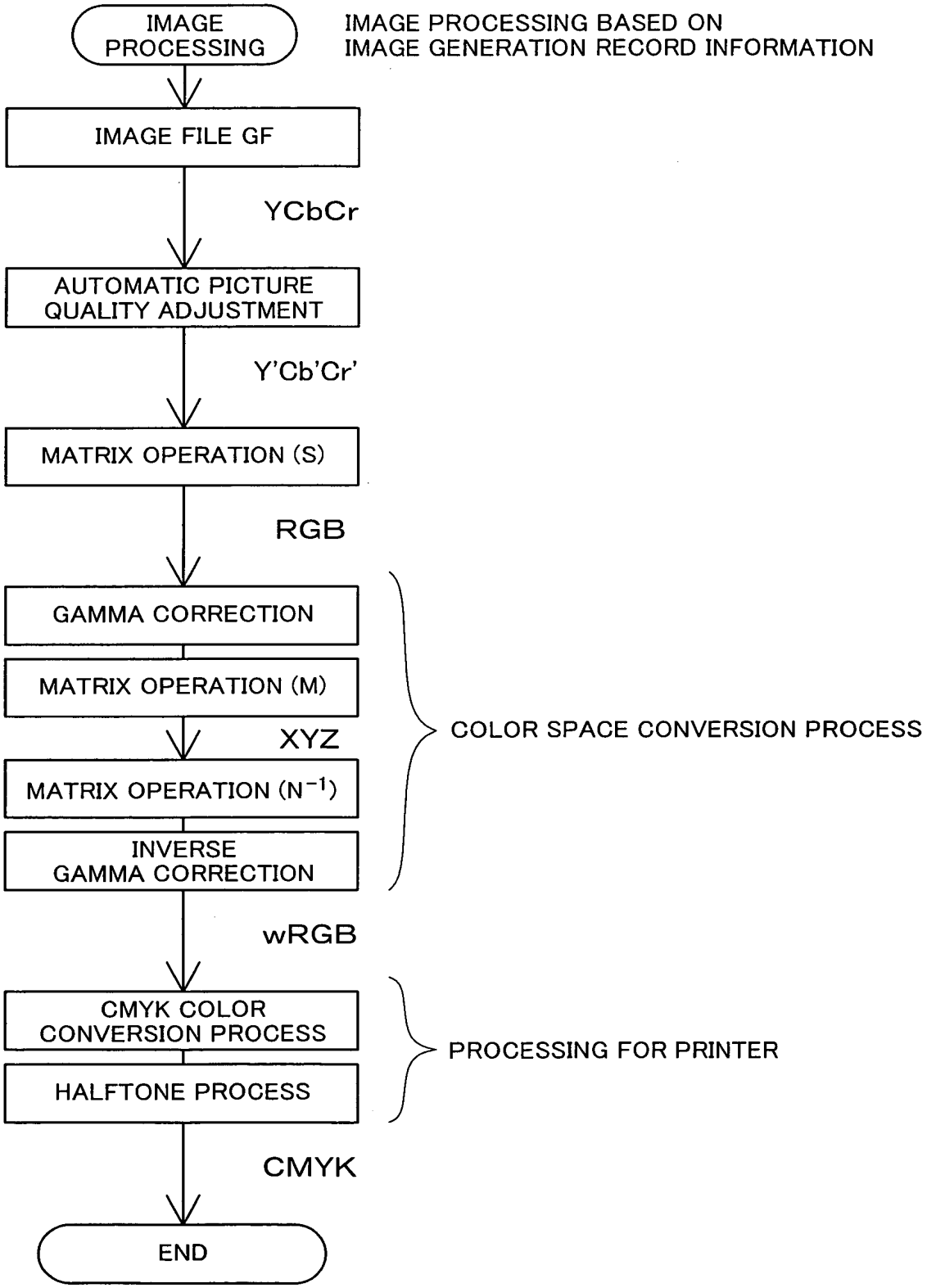
IMAGE PROCESSING
IMAGE PROCESSING BASED ON IMAGE GENERATION RECORD INFORMATION
IMAGE FILE GF
YCbCr
AUTOMATIC PICTURE QUALITY ADJUSTMENT
Y'Cb'Cr'
MATRIX OPERATION (S)
RGB
GAMMA CORRECTION
MATRIX OPERATION (M)
XYZ
MATRIX OPERATION (N^{-1})
INVERSE GAMMA CORRECTION
COLOR SPACE CONVERSION PROCESS
wRGB
CMYK COLOR CONVERSION PROCESS
HALFTONE PROCESS
PROCESSING FOR PRINTER
CMYK
END

Fig.26

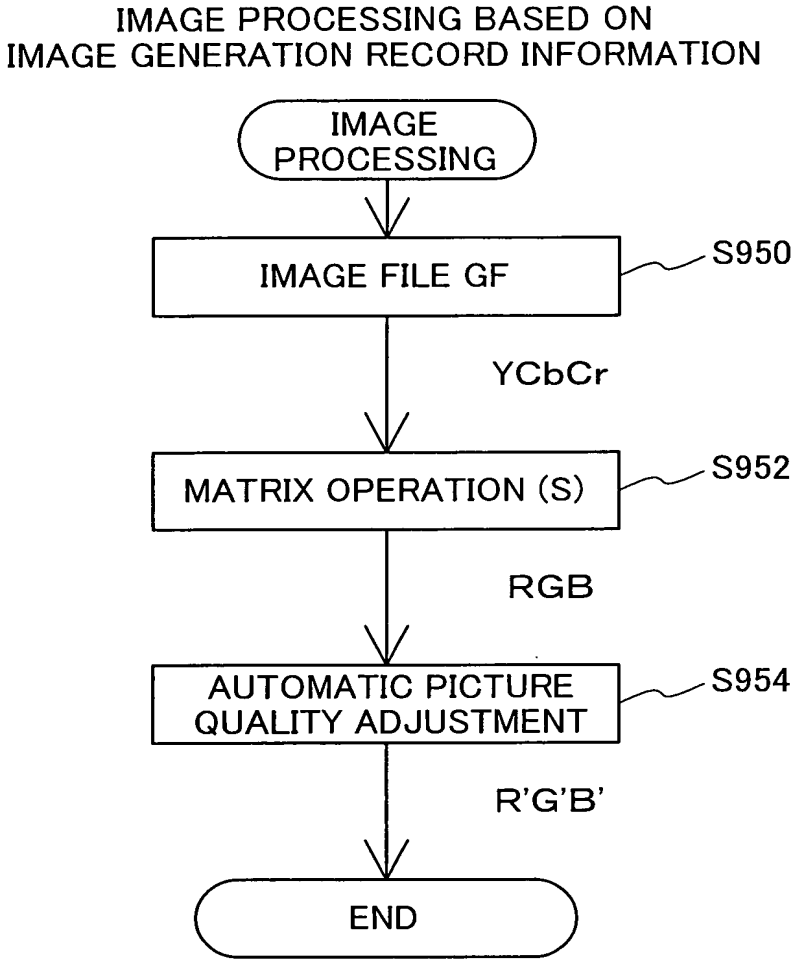
IMAGE PROCESSING BASED ON IMAGE GENERATION RECORD INFORMATION
IMAGE PROCESSING
IMAGE FILE GF
S950
YCbCr
MATRIX OPERATION (S)
S952
RGB
AUTOMATIC PICTURE QUALITY ADJUSTMENT
S954
R'G'B'
END